DUAL HABITATS:
RECONCILING NATURE CONSERVATION WITH THE NEEDS OF LOW-INCOME COMMUNITIES IN FORTALEZA, BRAZIL

by

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ABSTRACT

Protecting natural areas is a vital component of environmental policy, both to maintain dwindling biological diversity and to protect the natural productivity of land and water resources. Since the early 1980s, conservation experts have agreed that parks and reserves are more likely to meet their objectives if they can benefit local people. Integrating conservation and social concerns has, however, proved extremely difficult; successful examples are rare, particularly in developing countries.

In 1989 the state government of Ceará, one of the poorest states in Brazil, created a 446 hectare biological reserve to protect a mangrove swamp in the center of the state's capital city, Fortaleza. Simultaneously, it provided funds and technical assistance to upgrade the houses of some 10,000 squatters living on the edge of the park, contrary to the more usual practice of removing or relocating squatters. The squatters now help the authorities protect the area by preventing further land invasions near their communities.

This study analyses why a poor state in a developing country invested its own funds to conserve a mangrove swamp, and how it simultaneously managed to integrate the needs of local people. Particular political and financial opportunities gave the state incentives to create the park, while the layout of the land in question forced the authorities to reconcile this plan with squatters' housing needs. Once the state integrated conservation with housing, previously conflicting interest groups found that their campaigns were mutually enforcing.

The project became politically feasible because it combined a multitude of interests and opportunities. Its success has subsequently helped other environmental initiatives in Ceará. The case indicates that although policy-makers cannot predict opportunities, they can manage and sometimes create the fortuitous circumstances that lead to successful projects.

The Parque Ecológico do Cocó protects a small area of mangrove, yet its principal interest does not come from its fauna and flora. It stands in the center of Brazil's fifth largest city as an example of the benefits of conservation and a small, but rare, instance where conservation was reconciled with the needs of local people.

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LIST OF ACRONYMS

AUMEF	Autarchy of the Metropolitan Area of Fortaleza, responsible for land use and urban planning issues. In 1991 AUMEF's name changed to SEDURB (Autarquia da Região Metropolitana de Fortaleza)
BNB	Bank of the Northeast of Brazil (Banco do Nordeste do Brasil)
BNH	National Housing Bank (Banco Nacional da Habitação)
CAGECE	Water and Sewage Company of the State of Ceará (Companhia de Agua e Esgoto do Estado do Ceará)
CEF	Federal Savings Bank (Caixa Econômica Federal)
COHAB	State Housing Company (Companhia Estadual de Habitação)
IDB	Inter American Development Bank (Banco Interamericano de Desenvolvimento)
SCHP	Community Society for Popular Housing (Sociedade Communitária de Habitação Popular)
SDU	State Department of Urban Development and the Environment (Secretaria de Desenvolvimento Urbano e Meio Ambiente). CAGECE, COHAB, SEDURB, and SEMACE report to SDU.
SEDURB	State Superintendency for Urban Development. Before 1991 this agency was called AUMEF (Superintendência de Desenvolvimento Urbano do Estado do Ceará)
SEHAC	Special Department for Housing and Community Programs (Secretaria Especial de Ação Communitária)
SEMACE	State Superintendency for the Environment (Superintendência Estadual do Meio Ambiente)
SFH	Housing Finance System (Sistema Financeira da Habitação)
SOCEMA	Ceará Society for the Environment (Sociedade Cearense de Defesa do Meio Ambiente e Cultura)

CHAPTER 1
INTRODUCTION

This thesis tells the story of a park established in 1989 in the city of Fortaleza, Northeast Brazil. The Parque Ecológico do Cocó covers 446 hectares (1,100 acres) of mangrove swamp, making it the largest urban park in Latin America, three times the size of Hyde Park in London (364 acres), and 30% larger than New York's Central Park (840 acres). The park, however, is significant for more than just its size.

First, governments in developing countries do not often put environmental issues high on their priority lists, and very rarely invest their own funds to conserve ecosystems. In the Cocó case, a poor region of a developing country created an ecological park in the center of its capital city entirely as a local initiative; outsiders were not involved technically or financially. Second, although parks in urban areas are often created at the expense of the poor, by removing squatters and razing their settlements, the Parque do Cocó managed to incorporate the needs of low-income communities. The poor typically undermine protected areas by taking resources and/or invading the land, and public authorities then deal with these squatter intrusions by increasing monitoring Since the early 1980s, park planners and professionals have agreed that this is an expensive and often ineffective response, and that they must design protected areas to compensate local people for loss of access to the land, and preferably also to give local people incentives to conserve the areas (IUCN 1980, McNeely 1988, McNeely and Miller 1984, Wells and Brandon 1992). Very few parks, however, have managed this successfully. In contrast to most

experiences, however, when state agencies created the Parque do Cocó, they also provided housing and services to some 10,000 squatters that had been living in shantytowns on the edge of the mangrove, nearly 2% of the city's squatter population.[1]

The Parque do Cocó covers 1.3% of the municipality's 33,600 ha total area, just outside the city center in one of the most desirable residential areas. Some 90% of the park is mangrove swamp, whose lush foliage and meandering waterways provide pleasant views for those living nearby and for people traveling through the city. The recreational area of the park hosts free popular music concerts and political rallies. In short, the park has become an integral part of the city as well as protecting an important part of its ecosystem. The principal agency involved in planning and implementing the park was the state urban planning agency, SEDURB,[2] which spent 22% of its total project budget installing the park between 1987 and 1991 (AUMEF 1991).[3] This was almost twice the cost of its next largest project. This paper examines what motivated a poor area of a developing country to invest such large amounts of its own funds to protect an ecosystem.

Much of the literature on conservation projects suggests certain factors, such as committed leadership, environmental education and integrated planning to reconcile conservation with development, are prerequisites for, or contribute to successful projects (Kiss 1990, McNeely and Miller 1984:xi, Verwey 1989, Wells and Brandon 1992). The Parque do Cocó, however, did not rely on those factors.

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1 The state government funded the construction of some 2,200 self-built houses for an estimated 10,000 people as part of this initiative. Fortaleza's squatter population in 1991 was 541,000 (SAS 1991). The shanty towns upgraded as part of this project are Aerolândia, Conjunto Tasso Jereissati and Conjunto Tancredo Neves all on the banks of the Lagôa do Cocó.

2 SEDURB was called AUMEF before 1991. To avoid confusion, I use SEDURB throughout this paper.

3 The SEDURB documents give a figure of US$ 3.1 million, which is impossibly high, given that it does not include the land costs. Throughout this paper, I inflate all prices to June 1992 and convert to US$ at a rate of US$1 : Cr3,100.

First, when the governor signed the decree[4] to create the park, he was responding to series of pressures and opportunities, rather than acting out of commitment to sustainable development. Some of the political and administrative leaders of the projects may have been extraordinary individuals, but they did not need to be for this project to succeed. Second, of all the actors involved in the project, only technicians had any environmental education. In fact, now the park is successfully completed, it forms part of the state's environmental education program. Third, the goals of integrating environment and development were not set *a priori,* but emerged during the course of the project. In this case, bringing together powerful interest groups and being prepared to respond to sudden opportunities were both more important than the general prerequisites cited in the literature.

The project is complex, and managed to neutralize opposition and eventually get support from many different interest groups, including environmental campaigners, powerful landowners, low income communities and state government officials. Many factors in this case were inadvertent and contingent upon a chain of specific local circumstances, but they need not have been. The Parque do Cocó yields general lessons for many types of initiative, not only conservation projects. Managers may not be able to predict or reproduce particular circumstances, but they can manage opportunities that arise, be prepared to take advantage of them and, at times, create them.

1.1 Methodology and Organization of Study

The study is based on three months of research in Fortaleza, capital of the State of Ceará, Northeast Brazil, between June and September 1992, and is one of a group

4 Decree 20.235 of 5 September 1989.

of seven research projects looking at successful policies and projects in the state of Ceará. I use material from a total of 57 interviews and 12 site visits, detailed in Annex 3. I interviewed politicians, public officials, leaders and members of neighborhood associations, and environmental campaigners. I also interviewed two people who had opposed the park. Conducting the analysis, I referred to local newspapers, official documents and academic studies that relate to the park area. I also reviewed literature on park planning, low-income housing and service provision, and institutional design.

The study is organized into six chapters. This first chapter introduces and outlines the case. The middle four chapters then examine the reasons that this case was successful, and the effects it has had on other parts of the city. Chapter 2 discusses the environmental aspects of the project, and Chapter 3 discusses how it was easier for the state to create its first ecological park in an urban rather than rural location. In Chapter 4, I discuss the movement for popular housing, and how SEDURB managed to integrate conservation with the needs of low-income communities. In order to take advantage of the political opportunities, the state had to implement the project rapidly and efficiently, and so the fifth chapter discusses how the different agencies administrated the project. The sixth and final chapter outlines my conclusions from the case.

1.2 Background to the Case Study

Fortaleza, a city of almost two million inhabitants, is the capital of the state of Ceará. Situated on the Northeast coast of Brazil, the metropolitan region is home to some 30% of the state's population of six million. Ceará is one of the poorest states in Brazil, and, in the country with one of the most unequal income

distributions in the world,[5] Ceará is one of the most unequal states.[6] In 1991, per capita GDP in Ceará was only 42% of the national average (IPLANCE 1992) and 47% of Ceará's urban population earned no more than one minimum salary, around US$ 70 per month (Forum 1992).[7]

Urban poverty is acute. The urban population has grown faster than the population as a whole, while the population living in shanty towns has grown even faster. Between 1985 and 1990 the total population of Ceará grew by 10% while the total urban population increased by 16%,[8] but between 1985 and 1991, the *favela* population went from 352,000 to 540,000, an increase of 54%. This means that 31% of Fortaleza's population lives in *favelas*.[9] (IPLANCE 1992, SAS 1991). In 1991, 29% of the population of the metropolitan region of Fortaleza was without piped water, and 82% did not have adequate sanitation (CAGECE 1992). The coverage for water and sewerage services is worse in Ceará than in Brazil as a whole, and even than in the Northeast as a whole, as Table 1 shows.

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5 The top 10% of households receive 46.2% of the country's total household income, while the bottom 20% receive 2.4% (WDR 1992:277). Both of these figures are the most extreme for all of the countries listed in the World Development Report. For comparison, in the USA in 1990, the top 20% of households received 44.3% of the income, and the bottom 20% received 4.6% (US Department of Commerce 1992).

6 The 1989 Gini coefficient was 0.68 for Ceará, compared to 0.64 for Brazil as a whole and 0.65 for the Northeast (IPLANCE 1992 and IBGE 1991). A Gini coefficient of 1 indicates perfect inequality (*i.e.* with one person having all the wealth and the rest having none). A measure of 0 indicates perfect equality (*i.e.* where all persons have an equal share of the wealth). The 1990 Gini coefficient for the USA is 0.43 (US Department of Commerce 1992).

7 The minimum salary is officially US$ 100 per month, yet it never reaches this amount because monthly inflation of over 20% devalues it, and it is adjusted more slowly than inflation.

8 The 1980 census projected the state's urban population in 1985 to be 3.5 million and preliminary data from the 1990 census gives a 1990 figure of 4.1 million. This reflects patterns nationwide. Over that period, the population of Brazil increased by 11% and the urban population by 15% (IBGE 1991).

9 *Favela* is a Brazilian term used interchangeably with shanty towns, defined as "an agglomeration of precarious, particularly irregular housing, in comparison to other housing in the area, occupying land owned by third parties for the most part, lacking infrastructure and with 25 or more houses." (SAS 1991, my translation).

Table 1
Urban Population Without Water and Sanitation Services, December 1988

	Brazil	Northeast Brazil	Ceará
Population Without Water	19%	31%	53%
Population Without Sanitation	64%	88%	92%

Source: ABES 1989

Over the period covered by this study (1969-1990), both Brazil and Ceará experienced marked political changes. A military dictatorship took power in 1964. This regime suspended freedom of assembly and controlled political opposition, and in Ceará a small élite of large rural landowners, known as *Coronéis* had dominated state politics. In the 1980s, authoritarianism gradually declined, culminating in a return to civilian rule in 1985. In the 1986 gubernatorial elections, Ceará marked an important change away from the *Coronéis* by electing a wealthy, 36 year old, urban businessman. When Tasso Jereissati took office, state finances were in total disarray. Total tax revenues covered only 70% of the cost of the wages of state employees *(The Economist* 7-13 December 1991). The new governor emphasized collecting state taxes and cleaning up government payrolls, reforms that bore fruit two years later, when the state had repaid the debt, and balanced its budget. The improved financial position made it possible to finance the projects described in this study.

The River Cocó runs a 45 km (28 mile) course SW-NE from its source in the Aratanha mountains, to its mouth on Fortaleza's principal beach (see Map 2). The river basin drains an area of 517 km^2, in the municipalities of Fortaleza, Aquiráz and Pacatuba (SEMACE 1990b). Water quality is low, principally because of organic contamination from residential areas discharging sewage untreated into the river. The city's uncontrolled landfill site at Jangurusú also leaches some toxics into the river (Leitão 1992). It is the only river that runs

through the center of the city of Fortaleza, although the Rio Ceará runs along the municipality's Northwestern border.

The Parque do Cocó was worth protecting because it is a mangrove swamp, tropical ecosystems that have risen to prominence over the past two decades. They arise in coastal areas on relatively sheltered, muddy, low-lying terrain, principally in areas of variable water salinity, and are associated with particular plant and animal species (SEMACE 1990a:15, IUCN 1983). Mangroves play an important role along shorelines, preventing erosion, recycling and exporting organic nutrients, and as a habitat for birds, mammals, reptiles and insects. Their most important role is as a nursery ground for fish and shellfish (IUCN 1983). Studies in other mangroves indicate that 60-85% of commercially important fish species depend on mangroves at some stage in their life cycle (Hamilton and Snedaker 1984:25). Scientists have identified 25 fish species in the River Cocó (Leitão 1992:12), but fishing from the River Cocó is limited to low-income individuals taking crabs and fish for subsistence and some resale; high levels of pollution have precluded more intense exploitation.

Some 60 species of trees and shrubs grow exclusively in mangrove habitats around the world, but mangrove trees can be divided into six principal types, three of which, are found in the Parque do Cocó, *Rhizophora mangle* (red mangrove), *Avicennia shaueriana* and *Avicennia germinans* (black mangrove) and *Laguncularia racemosa* (white mangrove) (IUCN 1983, Maragos *et al.* 1983, SEMACE 1992). Mangroves occur around estuaries all along the Brazilian coast, and have been threatened throughout their range. Some Brazilian states have attempted to conserve mangroves to protect the offshore fishing industry; São Paulo and Paraná states, for example, established a coastal zone management plan to protect mangroves for the benefit of local people (McNeely 1988: 157), but

Fortaleza is unusual in having preserved the mangrove ecosystems within the city boundaries.

Despite the area's biological importance, the state only protected it because a combination of political and economic circumstances made creating an ecological park both attractive and possible. The pressures and opportunities for environmental protection are the subject of the next chapter.

CHAPTER 2
THE ENVIRONMENTAL PROJECT

The Cocó park did not depend on the factors often cited in the literature as prerequisites for successful projects. It was contingent on a complex combination of local circumstances, rather than depending on general factors that could run across many projects. I do not wish to deny the importance of factors such as environmental education and integrated planning, but rather to point out that this project succeeded without them.[10] This chapter discusses the combination of pressures and opportunities that made the politicians want to create the park, and then discusses how the initiative fits with other environmental policies in Ceará.

2.1 Pressures and Opportunities

A long campaign by environmentalists in Fortaleza had a major influence on the park project. The main initiators of the movement to protect the mangrove came from the city's intellectual élite.[11] Prof. Flávio Torres de Araújo founded the Ceará Society for Environmental Protection (SOCEMA) in 1976, when he returned from studying for his doctorate in physics at Oxford. During his time in the UK, he had witnessed the growing power of environmental protest movements and decided to start a similar non-governmental organization (NGO)

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10 Hirschman (1958) has argued that waiting for the prerequisites for successful projects is like waiting for development itself. He points out that projects can create the conditions for their own success.

11 Typically, movements to protect species, ecosystems or areas of beauty are led by members of local elites (Morell and Poznanski 1985, Paehlke 1989). Low income groups generally mobilize for environmental protection when problems threaten their health or livelihoods (Jain 1991, Leonard 1985, Lemos 1991).

when he returned to Ceará. The group had four principal campaigns: to prevent the use of a toxic herbicide, to protect the coconut trees on the city beach front, to stop ships discharging bilge water close to shore and a fight to protect a small area of mangrove on the banks of the River Cocó, which was to represent the height of the organization's powers.

SOCEMA began the campaign to protect the Cocó mangroves in 1977. It fought only for this small site to be turned into a leisure park, but the campaign marks the first chapter in the 15-year story of citizen movements to preserve the mangrove swamp and clean up the river. The leisure park created as a result of this struggle is known as the Parque Adail Barreto, and now forms part of the 446 ha Cocó ecological park.

SOCEMA began their 1977 campaign when the Bank of the Northeast of Brazil (BNB), a federally-funded development bank based in Fortaleza, proposed building a new headquarters building on the margins of the Rio Cocó. The municipal government owned the land and had designated it for the city's first park in 1969, but lack of funds at that time had forced them to abandon the plans (*O Povo* 10 March 1978). The mayor in 1977, Evandro Ayres, approved of the BNB plan, and changed the zoning restrictions to allow construction. These negotiations were reported widely in the local press.

The environmental activists decided to campaign against this plan and to force the municipal government to convert the land into a leisure park. They saw the mangroves along the river Cocó as the last area of green space close to the city center. The BNB building would remove only a small part of that area, but it was one of many incremental threats to the land, and it had a high public profile. SOCEMA therefore campaigned for ten months, at first chiefly by writing articles for local newspapers and giving talks at conferences. Any expenditure (for example for street handouts, posters and advertising space) came from members'

own pockets. The organizers focused the campaign on one major public demonstration, an "eco-picnic" they held on the banks of the River Cocó in April 1978. Some 2,000 people came to this event, and it was the largest-scale protest Ceará had ever seen for an environmental cause.

SOCEMA turned out to be David to the BNB's Goliath, as this small group of environmentalists managed to fight off the large and powerful institution. Only eleven days after the picnic, the president of the BNB wrote to the mayor calling off the deal, citing administrative delays (*O Povo* 13 April 1978), although he now agrees that the protest caused his change of plans.[12] Between the beginning of the campaign and the eco-picnic, Fortaleza had elected a new mayor, Luis Márques, who changed the zoning regulations for the site so that it was protected. Márques was succeeded a few months later by Lúcio Alcântara, who aligned himself more with the SOCEMA activists. He directed the municipal urban planning agency to begin converting the site into a leisure park less than a year after the BNB had withdrawn.

Why was an environmental pressure group in one of the poorest states in a developing country able to organize such a successful demonstration? How was this possible at a time when the first wave of enthusiasm for environmental issues coming from the 1972 Stockholm conference was waning globally, and the second, more recent wave had not yet started?

Today, many of the organizers attribute at least part of the power of the protest to the overall political climate at the time. As noted earlier, a military government ruled Brazil in 1976, and large-scale civil protest was illegal. The active members of SOCEMA came from the political left, people with experience tapping into people's dissatisfaction with their political leaders. Four of the five

12 Personal interview, 21 July 1992.

founder members of the society had been involved in the student movement in the 1960s; one had represented Amnesty International in Ceará, and was active in the feminist movement. Three of those four were professors at the Federal University (from the departments of physics, geography and biology), which lent them technical *gravitas* in different fields. The fifth member was a practising architect, with connections among other architects and engineers.

In 1977, most public demonstrations were illegal, but the authorities allowed the eco-picnic because it was not explicitly political. Many of the people who came to the picnic, however, did so more for political reasons than for concern over the mangroves. This event was a rare opportunity to protest. What is more, it was a protest against a public institution. Most people did not resent the BNB itself, but saw it as a representative of the political regime they hated. As Torres put it, "SOCEMA was the first escape valve allowing people to say no to the BNB and to the authorities." In some ways, therefore, this early protest was not solely concerned with environmental issues. It owed a good part of its success to people's long-running dislike of the authoritarian government piggy-backing onto an environmental cause.

This initial success gave the city a small open space, but did not protect the rest of the river's ecosystem. SOCEMA continued to protest against specific threats to the mangrove. One campaign was against a company owned by Tasso Jereissati, who was to become state governor in 1986 and to sign decrees creating the Parque do Cocó in 1989. His company proposed a shopping mall in the late 1970s. SOCEMA's protests failed, and the company built a shopping center, Iguatemí, on the site in 1982. SOCEMA, however, feels that the struggle ensured that the governor knew about the strength and duration of public concern about the Cocó mangroves.

The second major wave of campaigning for the park coincided with the overall political liberalization that swept the country in the mid 1980s. A group called SOS Cocó formed, consisting of SOCEMA and other members of prominent, well-respected professional organizations. These included the state branches of the Brazilian Institute of Geographers, the Association of Agricultural Engineers, the Brazilian Institute of Architects, the Professional Biologists' Association. The group also included less mainstream organizations, such as the state branch of the Green Party. SOS Cocó had broader objectives than SOCEMA had had in the earlier campaign against the BNB. Whereas in the late 1970s the environmentalists wanted to create an open space in the city, now campaigners focused both on protecting the mangrove ecosystem and on cleaning up the river. From this point onwards, a series of aldermen *(vereadores)* and state deputies put proposals to protect the area before the city and state Legislative Assemblies, which passed nothing until 1986, when the municipality declared the whole area below the 3m water line[13] an environmental protection area.[14] This action was largely symbolic, as the area was already protected under the state's water laws, and the municipality's motives for this initiative are unclear. Lack of enforcement, however, meant that protection under neither the state water laws nor the municipal environmental area sufficiently protected the vegetation from periodic threats by developers and squatters, who continued to cut the mangrove and build on the land.

In summary, therefore, 15 years of constant pressure from various groups in civil society pushed both the city and the state government into realizing that sooner or later one or other of them would have to expropriate the land and establish a park in order to protect the area and mollify public opinion.

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13 This is the line 3m above sea level on the banks of the River Cocó which corresponds to the environmental protection zone designed to protect the water resources.

14 Municipal Decree 7302, of 23 January 1986.

In addition to public pressure, at least four other factors contributed to state politicians perceiving the advantages of establishing the park. First, a sudden opportunity arose that allowed the state to expropriate the land cheaply. As described in the following chapter, the state urban planning agency (SEDURB) struck bargains with two landowners who then donated the land to be protected, in return for permission to develop other parts of their land. SEDURB also overcame one landowner's opposition to the park by taking advantage of a debt he owed to the state.

Second, by the late 1980s, the state government began to see the political benefits of a good environmental record. At that time, it knew Brazil would be hosting the 1992 United Nations Conference on Environment and Development, and the governor of Ceará realized that this would bring increased media attention to environmental initiatives in Brazil. The state government would be able to use the Rio '92 conference to show its new green credentials. When the conference did actually take place, the park was already in existence, and the government of Ceará extracted its full publicity benefits. It erected a display and took full page adverts in national magazines showing the Parque do Cocó ("the largest urban park in Latin America") as the showpiece of its environmental efforts.

Third, once the state had decided to build the park and clean up the river, it became clear that this could help give the state institutional credibility with international donors. Since 1987, Ceará had been involved in negotiations for a major loan from the Inter-American Development Bank (IDB) for sewage treatment infrastructure. Most of the international aid agencies hesitated before lending to states in Brazil, feeling that local institutional capacity and financial controls were too weak. Ceará could show the IDB and other potential donors

that its institutions were capable of implementing serious environmental programs by cleaning up the river and preserving the mangrove.

Fourth, some environmentalists say that the governor, Tasso Jereissati, favored the project because it would benefit one of his investments. As mentioned above, his company had constructed Iguatemí, the city's only large shopping center, by cutting an area of mangrove in the early 1980s. By 1989 this business was thriving; creating the park would simultaneously preserve the scenic area around the shopping center, and prevent anyone else from setting up competing businesses nearby. Whether or not this last motivation was important, public pressure and the other three opportunities alone were powerful enough to make the project an attractive proposition.

This section, in sum, shows the factors that contributed to the politicians wanting to create the Cocó park. In the following section, I show the park's connection to other environmental policies.

2.2 Links with Broader Environmental Policies

The Parque do Cocó fits into Ceará's environmental policy framework in two ways. First, SDU agencies created the park at the same time as they made other investments to improve the river's water quality. Second, once the officials had created the park, they found the experience informed future environmental initiatives.

Although public pressure and attention focused on protecting the green area in the city center, the state had to improve the river's water quality, because the value of creating an ecological reserve would have been undermined if the river flowing through it remained contaminated. Three principal sites upstream of the park polluted the River Cocó: the shanty towns of Aerolândia and

Conjunto Tancredo Neves, the industrial park in Maracanaú, and the uncontrolled landfill site in Jangurusú (see maps 2 and 3). Agencies from the state department of urban development and the environment (SDU)[15] tackled all three at the same time as they began planning to protect the mangroves. They reduced pollution from the *favelas* by upgrading the areas and installing sewage treatment plants, as described in Chapter 4. In Aerolândia, on the north bank of the river, SEDURB installed anaerobic treatment plants, which discharge only treated effluent into the river. Waste from Tancredo Neves and Conjunto Tasso Jereissati flows into a stabilization lagoon.

To treat the industrial effluent, the state water company, CAGECE, built a large but technically simple treatment plant, that came into operation in March 1992. The plant consists of five large settlement tanks, and collects sewage from nine residential areas as well as the industrial park. The state government paid 58% of the US$ 4.5 million cost. The National Bank of Social and Economic Development paid the remainder (*Diário do Nordeste* 25 March 1992).

The landfill site pollutes the river when rainwater percolates through the waste and forms leachate high in organic materials and containing some heavy metals (Leitão 1992). This leachate then flows into the river. SEDURB, together with the municipal waste agency, decided to build a new, controlled landfill site away from the center of town. This new site, located in the nearby municipality of Caucaia, came into operation in late 1992. As waste remains on the original site, it will continue to pollute the river Cocó, but the new landfill site will ensure that no new waste is added to the old polluting site. SEDURB spent US$ 2 million project.[16]

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15 4 agencies fall under SDU: the state urban development agency, SEDURB; the state environment agency, SEMACE; the state popular housing company (COHAB), and the state water and sewage company, CAGECE.

16 By 1991 SEDURB had spent US$ 1.4 million on the landfill site and estimated that it would spend a further US$ 690,000 to complete it (AUMEF 1991). The figures indicate that installing the park

In addition to fitting within these simultaneous initiatives, the Cocó park affected subsequent environmental policies. Once the authorities had created the park, they found that the experience affected environmental projects in three ways. First, the success of the experience showed politicians and officials in Ceará that conservation is possible and popular. The state environmental agency, SEMACE, which has taken over responsibility for park planning from SEDURB, is now planning several other parks throughout the state. It has created a 31.5 ha park around the Lagôa de Maraponga close to Fortaleza and another around the Lagôa de Fazenda in Sobral, and is planning a second park in Fortaleza, this time to protect the Rio Ceará, the city's other river. SEMACE is also working with the federal environmental agency, IBAMA, to establish a large protected area integrated with rural development in Jericoacoara, north of Fortaleza.

Second, activists learned from the Cocó experience. Environmentalists now see the importance of working with low-income communities to advance their own causes. Since the early days of the Cocó campaign, in the late 1970s, they have made determined efforts to help the poor voice their complaints about pollution and environmental degradation. For instance, SOCEMA members fought a polluting tannery, Santo Antônio da Floresta, in the early 1980s by working with the poor communities whose drinking water was affected. As the head of the Green Party in Ceará said, "The Cocó fight taught us that we couldn't just stand in the middle of the road waving flags. We have to involve local people at the same time as we interact with those in power." Community leaders also learned from the Cocó experience. Now, two years after SEDURB built the

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cost twice the cost of the landfill. This seems highly unlikely, given that it does not include land expropriation.

park, community leaders routinely use environmental arguments when they press their claims. Those former squatter communities close to the Cocó park use their location to strengthen their arguments for more services from the city or state. For example, one community leader from Lagamar, a large shanty town just outside the park on a canal that drains directly into the river, told a state housing official that his community should receive priority for housing improvements and sewerage repairs because it was situated on the edge of an environmental protection area and therefore threatening it.

Third, the project is contributing to environmental education in Fortaleza. School trips come to see the mangrove from boats on the river, and a visitor center describes the ecosystem. The park is a also the subject of publicity videos frequently shown on television, describing the state's environmental initiatives.

This chapter, in summary, shows that years of pressure from environmental activists combined with a set of specific opportunities to create the need to establish the Parque do Cocó, which itself was part of a broader set of environmental investments. Bringing different interests to support the project turned out to be more important than factors such as integrated environmental planning, often cited as prerequisites for success. Once the project was completed, its success then made politicians, civil servants and the public look more favorably on conservation projects than they had before, and helped the cause of conservation in other parts of Ceará. Many of the opportunities that stimulated the politicians to create the park were tied to the area's location. In the following chapter, I discuss how creating a ecological reserve was easier in an urban area than it would have been in a rural area.

CHAPTER 3
URBAN VS. RURAL CONSERVATION

An urban ecological park may sound incongruous, because those ecosystems that still exist in urban areas do not usually merit preservation on purely ecological grounds. Ceará has many larger mangrove swamps than those along the River Cocó, with greater species variety, and in far more pristine conditions. The Cocó mangroves make up only 1.4% of the 27,000 ha total area of mangrove in the state (SEMACE 1992). Why did Ceará's most influential NGO not campaign to save a larger, rural mangrove? Equally perplexing, why did the state make its first investment in conservation to protect an area that was in no way its most biologically valuable?

An outsider might expect decision-makers with the objective of protecting mangrove swamps to have planned to locate a park in the area that protected the most ecosystem at the least cost. In reality, however, rather than starting with a blank slate, policy-makers design projects that fit within the existing frameworks of interest groups, opportunities and policies (see Chapter 5). Except for very simple projects, decision-makers do not operate according to pre-determined or "scientific" models, but rather choose between policies that are only incrementally different from what already exists, and that are relatively easy to implement (Lindblom 1959 and 1979, March and Olsen 1976). In the Cocó case, these came together only in this urban location.

This chapter discusses how the urban location helped both politicians, officials and activists create the park, and how it made possible deals to expropriate land from two of the five landowners at no cost.

3.1 The Urban Advantage

Why did the state create an ecological reserve in the middle of a city? Much of the Cocó vegetation has been cut and has re-grown, and many non-endemic species have invaded the area (Rocha *et al.* 1987), and both factors reduce the area's biological importance. Even after the water treatment investments, the river is far from clean (Leitão 1992). Ceará's only environmental NGO, SOCEMA, fought its largest and most successful campaign to save part of the Cocó mangroves. When I first began to research this case, I found it difficult to understand why environmentalists had not allowed urban development to destroy the Cocó mangrove, fought for a smaller leisure park for the city and then turned their attentions to some of the state's large pristine mangroves. I now think that would have been the wrong strategy, for two reasons.

First, the Cocó mangroves play an important ecological role, because they prevent erosion and protect fish stocks. In many parts of Brazil, both the rural and the urban poor live partly from subsistence. Although no precise data are available, many of the city's two million inhabitants supplement their diets and/or their income with fish and shellfish from the river Cocó. This gives an added incentive for protecting the area, because if the river is polluted and the mangrove destroyed, the poor no longer have that supplement. The Cocó mangroves were the most threatened in the state, and therefore required the most urgent action.

Second, the urban location brought advantages both to the environmentalists and to the state. The visibility of the area to everyone in the city helped SOCEMA call attention to potential threats to the area. High

population densities (of rich and poor communities) around the area meant that the park would potentially affect many people. As one SOCEMA activist said, "The River Cocó flows through a large area of the city. When it gets polluted, that smell reaches a large number of people." This made it easier for SOCEMA to mobilize the community. The area's high visibility also made it popular with politicians. The governor wanted both his own electorate and a national and international audience to know of his administration's good environmental record. By locating a highly visible environmental initiative in the center of the city, the governor could ensure that almost everyone driving through the city would see the lush vegetation, and the signs linking the Parque Ecológico do Cocó to the Jereissati administration. Only those people specifically interested in conservation would know about a rural park, however large, but any visitor would see this urban initiative.

It is tempting to think that the Cocó park was merely a token way for the state to gain some environmental publicity. Protecting a small area of mangrove in the city center could, after all, absolve the state from any responsibility to protect other areas. In retrospect, however, the Parque do Cocó has served the cause of conservation in Ceará surprisingly well. The park has had an impact on subsequent initiatives and is part of the state's environmental education program, as described in Chapter 2.

In summary, locating the state's first conservation project in an urban, rather than rural, area was key to the project's feasibility. Environmentalists found it easier to mobilize people in the center of the city. The state government found greater political payoffs creating a park in an urban area. Far from being merely a token concession to environmental activists, this project has helped conservation throughout the state.

3.2 Innovative Deals

One of the major costs for agencies that want to create protected areas is that of compensating landowners for the land. Park planners can lose much time negotiating with powerful landowners, and often never reach agreement. Urban land is usually more expensive than rural land, so one would expect city parks to involve particularly troublesome land negotiations. The state managed, however, to expropriate the land for the Parque do Cocó relatively easily, because SEDURB could strike deals with the four private landowners. Three of these deals were only possible because the land in question was valuable (or in one case visible) urban real estate.

Once the team of ecologists had decided upon the borders of the area to be protected, SEDURB lawyers set about reaching agreements with the five landowners. CAGECE, the state water and sewage company, owned part of the land and did not require compensation for giving up its rights. Of the four private landowners, one was Grupo Jereissati, the company that had built the shopping center on 20 ha of mangrove in 1980. Tasso Jereissati, the company's owner, had now been elected state governor and was one of the main proponents of the park project. He donated the land to the state because he wanted the park to succeed, and because he could not be seen to benefit personally from the project.[17] The other major private landowners were the construction company Waldir Diogos (34 ha) the estate of Antônio Diogos (73 ha), and João Gentil, all influential and powerful people in the state. Gentil owned the largest single holding, 220 ha, nearly half of the park's 446 ha total.[18]

17 The size of the plots donated by Jereissati and CAGECE was not available.

18 Raimundo Ferreira Sales and his wife also owned a 1 ha plot that SEDURB expropriated by normal means.

SEDURB lawyers worked out a deal with the two Diogos, taking advantage of the restrictions already imposed on use of that land. State water laws of 1977 and the municipal decree concerning the river Cocó protected all land on the margins of the River Cocó less than 3 meters above sea level. Landowners had to get permission from SEDURB for any deforestation or other development. Creating the park would restrict the owners' rights to the land still further, because they would have to give up all of their access and commercial rights. A large part of the private land lay within the boundaries of the proposed park. But approximately 5% of the Waldir Diogos and Antônio Diogos plots lay outside the park boundaries and outside the area protected under the water laws. The owners had rights to commercialize this land in theory, but felt it was highly unlikely that SEDURB would grant permission. To create the park, SEDURB struck a deal with the landowners, whereby the agency granted them permission to build on the land outside the protected area in return for the owners donating the rest of the plot to the park. Under this agreement, the Waldir Diogos company and the estate of Antônio Diogos would be left with a small area in the most desirable residential area of town on which they were guaranteed permission to build an apartment building or office block directly adjacent to a large, permanently protected open space. Both landowners gladly agreed to the deal.

SEDURB could not work out a similar deal with the third private landowner, João Gentil, who owned the largest area, because all 220 ha of his plot lay within the area of the proposed park. Expropriation restricted his use of the land, so Gentil opposed the park, and announced that he would fight against it. SEDURB officials say that state water laws meant that Gentil had no rights to use the land below the 3 m mark, but Gentil disputes this. It seemed that SEDURB would have no choice but to expropriate the land, against Gentil's will,

and compensate him at market value, an expensive proposition that could have made the park prohibitively expensive. It turned out, however, that SEDURB could work out another deal, because Gentil owed a large debt to the state.[19] Few details of these negotiations are available, but it seems that the governor offered to forgive some or all of Gentil's debt in exchange for compensation for expropriating the land. On this basis, SEDURB went ahead and expropriated the land, but Gentil has subsequently disputed the sum he is to receive in compensation, and has taken the matter to court. To date no money has changed hands, and the case is still in court. The highly public nature of the Cocó case has, however, weakened Gentil's opposition to the deal. As he put it, "Now, when I object to the governor expropriating my land, the press paints me as an enemy of nature."

The Parque do Cocó implies, therefore, that conservation planners' assumptions that land expropriation imposes excessive costs on governments is not always correct. As in many other public and private sector projects, the ability to strike innovative deals is crucial to success (Frieden & Sagalyn 1989, Eccles 1988, Tendler 1991). In this case, the state, motivated by an interest in creating the park, managed to strike deals with two of the landowners and overcome opposition and push down the price of expropriation with the third. Given particular land characteristics, a conducive legislative framework and creative deal-makers, acquiring land for conservation through purchase or expropriation can be well within the financial reach even of poor areas in developing countries.

This chapter therefore explains how the urban situation helped make the Parque do Cocó possible. The activists found it easier to mobilize people because

19 This information comes from an interview with former governor, Tasso Jereissati.

a greater number of people would have suffered if the mangroves had been destroyed. The state wanted to create an urban park because the location increased the number of people who would see and benefit from the park. In an urban area, they were also able to strike deals with two of the landowners that depended on high land values. The urban location resulted in protection of a less than perfect ecosystem, but it is at least protected. Because it is small and biologically-impaired, this is probably not the park that some mythical "rational planner" would have designed in order to maximize conservation in Ceará, but it was the park that was easiest for officials and politicians to accomplish. By creating this park, the state "picked the low-hanging fruit", and now have an area successfully protected. The project's contingency on specific local circumstances described in the previous chapter can seem to leave no role for outside intervention, but its very dependence on contingency gave flexibility for the government to act opportunistically. The state was able to respond to specific pressures and take advantage of opportunities to establish the project.

One of the reasons for the project's success is its integration of conservation with the housing needs of local low-income communities. The next chapter describes Ceará's shanty town upgrading policies, and how the project managed to reconcile conservation and shanty towns.

CHAPTER 4
HOUSING THE HOMELESS

The Parque Ecológico do Cocó integrates conservation with housing and services for the low-income communities of Aerolândia, Conjunto Tasso Jereissati and Conjunto Tancredo Neves.[20] In this chapter, I show the forces behind the state's investment in low-income housing and behind SEDURB linking housing with conservation. I begin by discussing low-income communities' campaigns for shelter, which forced low-income housing high on the governor's priority list. I then discuss how the plans for the park stimulated SEDURB to upgrade the *favelas* on the edge of the park before other priority sites. Next, I discuss how the park planners had no choice but to include shanty town upgrading in the conservation project, and how this integration led to alliances between conservationists and community activists. This project was one of the state's first experiences with self-help housing, and the third section of this chapter describes the lessons from these early experiences that inform current upgrading practice.

4.1 Campaigning For Shelter

At the same time as the environmentalists were campaigning to persuade the authorities to create the park, another totally unrelated campaign was heating up. This campaign centered around providing shelter and services for the city's

20 Aerolândia grew up in 1987 when 2,000 families invaded state-owned land on the north banks of the Lagôa do Cocó. Conjunto Tancredo Neves, on the south banks of the lake, consists of some 800 squatter families and some 4,000 houses from a 1983 housing project. Conjunto Tasso Jereissati did not exist before this initiative and was created to house people relocated from the nearby *favela* of Lagamar

growing squatter community, and the pressure they created was vital in causing the park planners to integrate shanty town upgrading with the park project.

Since the end of the 1940s, the lack of adequate housing has been a persistent and acute problem in many cities in Brazil. As in many other developing countries, shanty towns have mushroomed in major cities, where people are crammed into inadequate housing without water or sanitation. Water-borne diseases bring grave health risks (Beckerman 1992), and, as cities become more crowded and people concentrate on ever more unsuitable land, squatters face additional problems. Living on steeply sloping land makes communities vulnerable to landslides; houses within flood plains of rivers or lakes make residents vulnerable to flooding; living on urban waste tips further increases the likelihood of disease (Kreimer and Munasinghe 1992).

In response to these difficult conditions, low-income communities in Brazil and throughout Latin America began to form neighborhood associations in the 1950s to press federal, state and municipal governments for low-income housing. In Fortaleza, for example 30,000 people joined in a march demanding low-income housing in 1962 (Braga and Barreira 1991:61). The military government in Brazil suppressed these movements, but they sprang up again in the 1980s, as the country moved towards democratic rule. Neighborhood associations pressurized government agencies to provide services to their community (Annis 1988, Cardoso 1989, Ferguson 1992, Gilbert and Ward 1985:206, Hardoy and Satterthwaite 1987, Jacobi 1990, Watson 1992). Politicians also often encourage these organizations to form, as they give opportunities for political patronage by providing services to the community in return for votes (Collier 1976, Braga and Barreira 1991).

The first mayor elected in Fortaleza since the military coup helped low-income communities mobilize for housing. Maria Luiza Fontenele, from the

Workers' Party (PT), gave high priority to helping low-income groups to mobilize for their rights. In 1987, nine years after SOCEMA's eco-picnic, she supported representatives from 123 *favelas* who occupied land outside the governor's palace for eight days, demanding land rights and housing in full view of anyone visiting top officials, including staff from the Federal Government and international donor agencies. Demonstrations of this type forced the problems of squatter settlements onto the state government agenda.

As the neighborhood associations became better at making their voices heard, the state government's position towards these communities began to change. Tasso Jereissati, elected governor in 1986, could not ignore them, and probably did not want to, because these groups formed a large electoral base. From the start of his term of office he encouraged community groups to form and emphasized increased public participation in projects (Braga and Barreira 1991:68). In contrast to all previous practice in Ceará, where politicians had tended to respond to individual requests in return for votes, the new administration insisted on demands made by an association representing a group of individuals.[21] The groups' concerns centered on shelter, and the state government gave a high priority to meeting their needs. By 1988, moreover, the federal government had devolved more power to the states, which gave Ceará more flexibility to conduct housing policies independently of the CEF. Past policies that relocated squatters to housing projects on the edge of the city failed for reasons I explain in section 4.3. The governor therefore mandated that the new programs should leave squatters on or close to the site of their original settlements wherever possible.

SDU officials therefore began to prioritize existing shanty towns for upgrading. They looked for the largest *favelas* where people were living in the

21 This fits with similar findings in Mexico (Fox 1992).

most precarious conditions. To keep costs down, they gave priority to settlements on state-owned land. One of their seven priority sites lay on the banks of the River Cocó. They owned land there because Virgílio Távora's administration had expropriated vacant land on the banks of the Cocó in 1980 and had dredged the river as a flood prevention measure, forming the Lagôa do Cocó. By 1982, the state had built 4,000 low-income houses and created the site, called Conjunto Tancredo Neves. The dredgers had dumped the waste material on state-owned land on the other side of the lake. During the 1980s squatters gradually moved in and built shanties on land around the Tancredo Neves housing project, and in 1987, 2,000 families invaded the land on the other side of the lake. The community that grew up on top of the lake spoil is now known as Aerolândia. The state government therefore already owned the land on both sides of the lake, making it prime site for upgrading. The following section will explain how the SEDURB park planners linked the shanty town upgrading project with the Parque do Cocó.

4.2 Integration of Conservation and *Favela* Upgrading

Much of the unusual nature of the Cocó park lies in the integration of conservation with the housing needs of three low-income communities. SEDURB park planners, however, did not intend to integrate the park with shanty town upgrading, any more than SEDURB and COHAB housing officials intended to link their first experience with self-help housing to an ecological park. The governor, with SEDURB and COHAB developed the two policies separately and the particular characteristics of the land around the River Cocó then forced officials to integrate the two sets of policies. The state would have intervened to improve the shanty towns on the edge of the park at some stage,

but the park plans stimulated SDU agencies to act earlier than they otherwise would have.

The park planners could not create the park without dealing with the shanty towns, as some 10,000 residents all discharged their waste directly into the river. Two of the *favelas*, Aerolândia and Tancredo Neves, had grown up on land that would ordinarily lie inside the protected area's boundaries. Clearly, from an environmental perspective, it would have been less than optimal to have people living within the boundaries of a protected area; all the more so when the people are crowded in unstable housing, without water, solid waste or sanitation services and constantly adding waste to the river the planners were trying to clean up.

At first, the park planning team which SEDURB coordinated felt it had two options. They could either remove these shanty towns, perhaps re-housing the residents in another area, or they could draw the park boundaries so that the shanties did not fall within the preservation area. After SOS Cocó's public protests, the governor had mandated SEDURB's land use department to create a park on the edge of the river. After the city's low-income communities mobilized for housing and services *in situ*, he had separately mandated another SEDURB department (along with COHAB and other agencies involved in popular housing) to upgrade *favelas* close to their original sites. If it was to fulfill both of these mandates, SEDURB had no choice but to provide the squatters around the Lagôa do Cocó with housing and water, waste and sewage services on the sites they already occupied.

The SEDURB park planning team therefore decided not to re-draw the boundaries, but only on condition that their agency's other department (along with COHAB) would upgrade the three shanty towns that were discharging waste into the Cocó. The land in Conjunto Tasso Jereissati and most of

Aerolândia lay outside the 100 year flood line, so it was not vulnerable to flooding and SEDURB could upgrade these settlements *in situ*. The Tancredo Neves community on the south bank of the Lagôa do Cocó lay within that line and many houses flooded each time it rained heavily. SDU provided land for this community to construct houses nearby in Barroso.

The park project therefore provided the impetus for the SEDURB housing department to select the areas on the banks of the Lagôa de Cocó for this early *mutirão* project, rather than one of their other priority areas. Once SEDURB had combined these two projects, they found that the two sets of activists independently pressing the state for housing and conservation were both in favor of the initiative. Their separate and previously conflicting campaigns became mutually supportive.

The low-income groups involved in this story fall into two categories. The first group, subsistence fishermen, stood to benefit from environmentalists' campaigns and consistently joined in the conservation protests. The second group, neighborhood associations fighting for housing and services, typically either have no links with environmental struggles or even conflict with them. As one resident of a Fortaleza shanty-town said, "We are living in paper and plastic houses that flood every time it rains. The governor should spend money on that, rather than beautifying the city with parks." Indeed, the SOS Cocó campaign had clashed with one of the squatter's organizations in the late 1980s. SEDURB had proposed filling in a small area of the River Cocó to build some 40 houses to shelter families from a nearby area. Some of the environmental activists opposed this, on the grounds that any cutting of mangrove and landfilling of the area was wrong, whatever the purposes, and that these people could be housed in another nearby area. In the end, the environmentalists lost the fight, and SEDURB built the houses. This argument (perhaps unfairly) lost the environmental movement

much credit in the eyes of both the authorities and the shanty town residents, who both felt that the environmentalists were somehow anti-poor.

Once SEDURB had planned to upgrade the *favelas* as they created the Cocó park, however, any pressure for one part of the project automatically helped the cause of the other. The environmentalists did not help the neighborhood associations receive services as a means of forcing the authorities to clean up the river, but an accidental complimentarity of the two groups' aims caused each working in its own self-interest to cooperate with the other.

This case shows the power of policies that elicit the support of apparently conflicting interests. Alliances between groups might be easier to form than either participants or observers may expect. In the Cocó case, separate policies came together and led to the park integrating conservation and shanty town upgrading. This was serendipitous, yet it need not have been. Politicians or officials could deliberately look for policies that overlap the several interests and turn rivals into allies as well as establish better projects.

4.3 Lessons From Self-Help Housing Programs

SDU upgraded the *favelas* on the margins of the Parque do Cocó using self-help housing, a technique known in Brazil as *mutirão* housing.[22] This involves legalizing squatters' land claims then providing building materials and technical support. The communities build their own houses, either on vacant plots or on the sites of their former residences (Rakodi 1990, Ospina 1985, Ward 1982). It is several times cheaper than constructing completed housing units.[23] Self-help housing is often plagued by organizational problems, but housing officials in

22 The term *mutirão* (plural *mutirões)* can be applied to many projects with a reciprocal arrangement where a group of people work together for individuals from the group.

23 The precise cost difference varies from project to project. In Ceará officials estimate that a *mutirão* house costs the state 10-15% of the cost of providing a completed house built to federal standards.

Ceará say that their program is unusually successful, and is recognized as such throughout Brazil. The Cocó sites were among the state's first full-scale experience with this form of upgrading. Shortly after the state began the Cocó project, and before they completed it, they began several other *mutirão* projects. Together, these early initiatives provided officials with experience and lessons for subsequent projects. In this section, I describe first why SDU chose self-help housing, and then discuss the lessons from the early experiences.

Low-income housing policies in Brazil have changed substantially over the last decade. Until the mid 1980s, federal, state and municipal agencies in Ceará and elsewhere in Brazil typically reacted to illegal settlements by evicting squatters, bulldozing the shanties, and relocating the squatters to public housing projects (Perlman 1980, Braga and Barreira 1991). Under the military government, public housing policy had provided families with ready-made houses with low-interest mortgages financed by the Housing Finance System (SFH), guaranteed by the National Housing Bank (BNH). State Housing Companies (COHABs) designed and built uniform houses to standard models, which the poorest sectors of society could seldom afford. Indeed, of the 4.5 million houses constructed under the SFH between 1965 and 1984, only 723,000 (16%) were aimed at low-income families (defined as those earning less than 3 minimum salaries) (Braga and Barreira 1991:79). Even when low-income families could afford the housing, they could often not afford to live there. The authorities located the housing projects on or beyond the edge of the city, in areas ill-serviced by urban infrastructure such as transport, health centers and schools (Perlman 1980). Commuting from these areas to jobs in the city center, for example, involved bus journeys of up to two hours each way and paying bus fares that could amount to more than 10% of a minimum salary. As a result,

large proportions of the "beneficiaries" abandoned the houses and returned to shanties in the city center.[24]

The democratically elected Sarney government brought in new policies. In 1986, it abolished BNH and passed most of its functions to the state-owned Federal Savings Bank (CEF). In 1987 CEF set strict borrowing ceilings for the state housing companies and established the Special Secretariat for Housing and Social Programs (SEHAC) to run a national program of self-help housing (*Programa Nacional de Mutirões Habitacionais*). Between 1987 and mid 1988, states across Brazil planned to build a total of 550,000 housing units, but completion rates were "very low" (Melo 1992:41). Ceará completed some 54% of the 4,121 houses planned under this program, although the state used its own funds to complete some of these houses after the SEHAC program ended (Braga and Barreira 1991).[25]

When the state government of Ceará decided to embark upon a shanty town upgrading program, it chose self-help housing, even though early experiences with the Federal program had been bad. Poor community organization rather than technical difficulties caused most implementation problems, such as community leaders stealing materials, communities never completing the project, or recipients selling their houses and returning to live in shanties. SDU decided that the cost advantages outweighed the risks of poor implementation. In 1989, therefore, SEDURB and COHAB[26] officials began a program to build some 1,400 houses on the edge of the Cocó park in Aerolândia

24 Several studies in Rio de Janeiro indicate typical default rates between 75% and 85% (Perlman 1980:270).

25 I do not have precise figures on implementation.

26 In shanty town upgrading projects, SEDURB is responsible for planning the sites and installing services such as street paving and drainage. COHAB is responsible for housing standards and technical support for the communities building their houses. The water and sewage company, CAGECE provides technical support for installing water and sewage works. The Department of Labor and Social Programs organizes the cadastres.

and Conjunto Tasso Jereissati. Both of these projects succeeded. In less than two years, the communities completed 575 houses on the north bank of the Lagôa do Cocó and 838 on the south bank, and installed water and sewage services for both communities. Many of the state's early projects were not so successful. Lessons from these early experiences have helped *mutirão* policies in Ceará evolve since the early days. The agencies and communities involved in the first few areas to be upgraded found several ways the program's organization could be improved, and implemented these changes. Some of these differences come from the Cocó experiences and others from subsequent or simultaneous projects, and I was not able to isolate the lessons the agencies drew directly from Aerolândia and Conjunto Tasso Jereissati and from those they drew from other cases. The changes fall into two categories: (i) the role of the *mutirão* coordinator, (ii) individuals' labor contributions.

(i) The coordinator is key to the success or failure of a *mutirão* project. He or she faces a major task, involving ordering building materials from suppliers, organizing teams to guard the stores, setting timetables for each family to start and complete their house and ensuring that the family keeps to the schedule, amongst other things. The coordinator must ensure that everyone understands how to build the house and that each house follows COHAB's plans. Perhaps most importantly, he or she has to keep track of the project's finances. At first, the elected community leader took charge of the housing projects, even if he or she was not receiving a house. The community leader's principal function was to present the neighborhood's interests to the authorities. He or she did not necessarily even live in the community, but simply lobbied for its interests with the state and municipal authorities.

Elected community leaders often had problems organizing housing projects, because the two roles conflicted. Whereas the community leader acted

for the residents in return for their support, the housing organizer was asking residents to contribute labor, and also had responsibility for handling the community's jointly owned funds. People in some neighborhoods resented the leader for asking them to work, they suspected him or her of using joint money for personal reasons, and sometimes turned their allegiance to another leader.[27] The community leaders also resented the extra burden, as one leader from Lagamar said, "We leaders had to take care of constructing houses, which is not our job. Our job as leaders is to get the governor to answer our claims." (cited in Braga and Barreira 1991:243, my translation).

Housing officials attribute many organizational problems (such as running over budget, disappearance of building materials, falling behind deadlines and failing to complete projects) to ineffective leadership. In three cases shortly after the Cocó experience, SDU officials attributed problems either to the community leader's corruption, or to the leader not commanding the community's respect. These problems did not occur in Aerolândia because of the power of its community leader. The authorities, however, cannot count on similar leadership in all communities.

In an attempt to reduce these problems, COHAB in Ceará changed its policies. Now the person responsible for building the houses must be different from the elected community leader. The *mutirão* coordinator heads up an organization called the Community Society for Popular Housing (SCHP). He or she must be receiving a house in that stage of the project, to increase the coordinator's incentives to complete the project. To reduce problems of community leaders skimming off funds and materials, COHAB has reformed the payment system. In the first projects, Aerolândia and elsewhere, the community

27 Peattie (1990) found similar outcomes in a self-help housing project in Peru.

leader and the treasurer of the community organization controlled the funds. SDU transferred the money in one payment directly to the community bank account. Under the new policy, it transfers the money in three installments (40%, 40% and 20%), and all checks to building contractors must be signed by the Community Society's president and treasurer, and the COHAB engineer responsible for the site.

The leaders of *mutirão* projects, however, still operate under perverse incentives. They must work full time for the one to two months it takes to construct the houses. When the state constructs ready-made houses, COHAB officials coordinate the project, yet leaders of *mutirão* projects are unpaid. Almost only unemployed people, therefore, can do the job. It is little wonder, then, that the coordinators sometimes steal building materials.

(ii) Family labor contributions for self-built housing projects can take many different forms. In the first *mutirão* projects in Ceará, each family in the community had to contribute a fixed amount of labor to the project in order to receive a house. The community built all the houses at once over the course of a few months. When they were complete, the community leader conducted a lottery to decide which family would receive which house. This meant that people building the houses had no idea where they would eventually be living, nor whose house they were building, and therefore that people had an incentive to become free riders. If they worked hard and built a sturdy house, they would probably not reap the benefits, as they might be allocated to a less well-built house somewhere else. People therefore often worked fewer hours than their obligation. Some families would send elderly people or children to do their share of the labor. Now, the communities organize the lottery as soon as the housing officer has marked up the plots for the new houses, so they know from

the beginning which house will be theirs. Each family is responsible for constructing its house, and making arrangements for mutual help as they choose.

This new system alleviates a second labor problem. The adults in around half the families of a typical project work during the day and employ a bricklayer to make their labor contribution. In the early projects, these families had to pay the bricklayer to work for the same amount of time that an unskilled resident had to contribute, even though a professional works much more efficiently than the untrained, inexperienced householders. Two bricklayers, for example, told me they built a house in four days, whereas a couple building their own, identical house next door said they expected it to take them around one month. This situation imposed unfair costs on the families that worked during the day. Now, they know from the start which is to be their house and only have to pay the bricklayer for the time it takes actually to build the house.

Although self-help housing projects in Ceará have been successful on the whole, the Cocó case also illustrates that agencies cannot apply the same policy in every situation. The history of different areas plays a vital role. Conjunto Tancredo Neves lies across the Lagôa do Cocó from the successful *mutirão* project in Aerolândia. Here, however, SEDURB only began the housing project in 1992. The 806 squatter families built their houses in nearby Barroso, because the original site was vulnerable to flooding. Not only did the program start later in Tancredo Neves, but this community also experienced more problems organizing the housing construction than did Aerolândia and Conjunto Tasso Jereissati.

Officials attribute both the delay and the construction problems to lack of community organization. Why, though, was this community less able to organize itself than Aerolândia on the other side of the Lake? Part of the reason lies in the different ways these communities invaded the land; indeed, experience

in other squatter settlements confirms that settlement patterns often influence squatters' abilities to organize (Gilbert & Ward 1985, Drakakis-Smith 1990). In Aerolândia, on the north bank of the Lagôa do Cocó, all the community members together invaded the land in 1987. As soon as the people had erected their shelters, they formed a neighborhood association and began a fierce campaign to receive housing and services from the state government. The community chose to lobby the state rather than municipal government because the state owned the land. The community leader, Dona Raimundinha, had been involved with an earlier upgrading project in nearby Lagamar, and had cultivated alliances with the head of the Secretariat for Urban Development (SDU), and openly affiliated herself with the governor's political party. This community leader was strong, some say authoritarian, but respected by the community. This organization allowed the community to build its 575 houses quickly and keep to the planned timetable.

Although Aerolândia was highly unified, Tancredo Neves was a fragmented community. The area had been the location of a state housing project (not self-help) in 1983.[28] The original residents had sold their houses, to the extent that by 1990, some 60% of the families who had received houses in the 1983 project had moved out. Many of the new residents were from the middle classes. During the 1980s, new squatters invaded the area around the houses, little by little. Each new family constructed its shelter closer and closer to the water's edge, until many homes were being flooded several times a year. When the authorities came to decide which families would be the first to receive housing in the *mutirão*, they picked the newcomers first as they lived in the most

28 The original housing project was itself problematic. The state constructed some 4,000 houses to house residents of a nearby *favela* , and the area was originally called O Novo Lagamar. After long delays in handing the houses over to the new residents, the squatters "invaded" their own housing project. This is described in Braga and Barreira 1991.

precarious conditions. The middle class residents of Tancredo Neves felt no allegiance to the landless squatters, and resented them for turning their neighborhood into a *favela.* Among the squatters, the early arrivals resented the newcomers for usurping their claims to *mutirão* housing. This lack of cohesion amongst the squatters explains, therefore, why this community had more problems constructing its houses and representing itself to the authorities.

To sum up, Ceará began a program of self-help housing, taking up the initiative of a defunct federal project. In the course of its early experiences around the Parque do Cocó and elsewhere in the city, the authorities improved their implementation practices. The settlements on the two sides of the River Cocó, however, gave different results largely because of the way the squatters had originally settled them.

4.4 Conclusion

Once planners of the Parque do Cocó integrated conservation with low-income housing, the park's chances of success increased dramatically, because previously conflicting policies and interests now overlapped and were mutually supportive. This integration, however, did not require leaders and civil servants dedicated to integrating conservation with the needs of the poor, or converted to the cause of sustainable development. Some of the key actors in this project may have been extraordinary people, but successful execution of this plan did not require them to be. Officials did not decide in advance to integrate environment and development, but this goal it emerged during project. Project goals often develop in this way, after or during projects (March 1972, March and Olsen 1976). Two separate policies, for shanty town upgrading, and to protect an ecologically important area had long parallel histories of struggle that came together at one particular time. Though environmental objectives drove the

initiative, the congruence of policies created the imperatives for the agency to reconcile conservation with the needs of low-income communities.

Once they had done that, the agencies in Ceará found themselves in their first full-scale shanty town upgrading project. They took the experience from these and other early projects and have developed a set of management techniques that make them among the best managers of *mutirão* housing projects in the country.

CHAPTER 5
ORGANIZING THE ADMINISTRATION

Part of the success of the Parque do Cocó is due to the administration of the project. Many apparently good projects fail because agencies cannot implement them effectively (Pressman and Wildavsky 1973). Implementation even of simple projects involves a complex and convoluted web of interdependencies. The state of Ceará managed to implement the Parque do Cocó and, furthermore, took it from planners' drawing boards to completion in little over one year. This chapter analyses the administrative factors that facilitated rapid implementation. First, I discuss the administrative structure of the project, with one, non-environmental, agency coordinating and implementing the project. In the second section, I discuss how the administration was easier because the plans were consistent with previous projects in the same agency. In the last section, I discuss two aspects of the project that reduced the overall administrative burden.

5.1 A Single Agency

The fewer agencies involved in a project, the easier it is to implement, because agencies have different agendas that they bring to bear on the project. When these agendas conflict, the relative power positions of the agencies involved tend to determine project outcomes (Grindle 1980, Tendler 1991, Pressman and Wildavsky 1973). Agencies' individual incentives can also hinder cooperation. For example, an environmental agency might want to create the largest park possible, whereas a housing agency might want to upgrade the largest squatter settlement in the city. Neither agency individually would in that case have

proposed creating the Cocó park and upgrading the shantytowns on the margins. Moreover, when an agency coordinates a project involving officials from several agencies, it runs the risk of being ignored as the team members pursue their interests, irrespective of the wishes of the coordinator (Chisolm 1989).

In the Cocó case, the state urban development agency, SEDURB, coordinated a multi-agency team. A marine biologist from the Federal University (although not from SOCEMA) led a team that consisted of three architects and a geographer from SEDURB, an architect from the municipal planning agency, and two environmental specialists from the environmental agency, SEMACE. How did SEDURB ensure that the agencies all worked together? First, as SEDURB is responsible for land use planning and urban infrastructure projects in the metropolitan region of Fortaleza, it is an implementing as well as a coordinating agency.[29] Agencies that implement projects usually have more money, power and prestige than those that only coordinate (Tendler 1991). Second, and probably because it has implementing capability, it is the most powerful agency of those involved in the park project. The agency also had good political connections, as its former head was now in charge of SDU. SEDURB could therefore use its power to overcome any inter-agency difficulties that arose.

The decision to locate the Cocó project in the urban planning agency was key to the project's success, but it too was contingent on particular local circumstances rather than deliberate design. Ceará had an environmental

29 The state created the agency as AUMEF in 1974, to coordinate urban planning issues in the metropolitan region of Fortaleza. Its role expanded to include some project implementation in 1987, and the Cocó park was one of the first projects it implemented. The agency's responsibilities expanded to cover urban areas throughout the state in 1991, when it became SEDURB. Its focal areas are urban infrastructure, such as sanitation, water resources and land use, repairing roads, paving public squares etc.

agency, SEMACE, at the time of the project, which should have been the institutional home of the park project. Indeed, SEMACE is now responsible for planning conservation initiatives. The park project began in 1988, only a year after the governor had created SEMACE. At that time the agency was still finding its feet, and could not take on a major coordination task. SEMACE was glad to let SEDURB take control of the project.

This choice of SEDURB over SEMACE not only aided implementation of the park itself, but also helped integrate the project with low-income housing. Earlier chapters describe the two independent movements that pressurized the state for this project: SOS Cocó campaigned for the protection of the mangroves and the neighborhood associations campaigned for housing and services. Because the environmental agency usually runs conservation projects and the housing agency usually deals with shanty town upgrading, environmentalists typically target the environmental agency and *favela* residents concentrate their efforts on the housing agency. Neither agency has an incentive to integrate their projects. Also, because agencies have unequal powers within governments, the separate campaigns depend on the relative strength of the agencies they address.

In the Cocó case, however, both campaigns targeted the same agency, because the same agency had responsibility for both parts of the project. Different departments within SEDURB handled the two parts of the project, and they did not formally communicate. Both groups of campaigners pressed their claims through the governor and directly on the agency. Neighborhood associations from Aerolândia and Tancredo Neves were bringing their petitions for housing and services to SEDURB at the time as SOCEMA was pressing them to protect the Cocó mangroves. Community leaders would sit waiting to speak to SEDURB housing officers outside the offices where the SEDURB park team was deciding whether to include the shanty towns in the park. Political

pressures to resolve both aspects of the case therefore fell on the two or three senior officials at SEDURB. When they then realized that the success of the project as a whole depended upon creating the park and upgrading the shantytowns *in situ*, they decided to integrate the two aspects of the project. The land use department and the housing departments continued to work independently on their parts of the project, they did not form a Cocó project team, but the project then proceeded as if it were an integrated whole.

Developments since the Cocó experience indicate that the government of the state of Ceará might lose the advantage it inadvertently designed for itself. SEMACE, the environmental agency, is now better established, and has taken over responsibility for planning all future parks, both urban and rural. As SEDURB still decides which shantytowns to upgrade, one agency is no longer responsible for the two types of decisions and bringing the two types of projects together may become more difficult.

In summary, when the governor decided to create the park, the state's environmental agency, which would normally have been responsible for the project was not ready to take on the task. This circumstance meant that the state land use agency took on the project. This was fortuitous for two reasons. First, because SEDURB was a more powerful agency than SEMACE, it was better able to implement the project. Second, because the park was now administered in the same agency that planned sites for shanty town upgrading, top officials could see the advantages of integrating the two projects.

5.2 A New Project Consistent With Old Plans

The Cocó project was complex. It involved bringing together environmentalists and neighborhood associations who had been involved in long, independent, and sometimes conflicting struggles. SEDURB had to negotiate the land

expropriation, design the park, construct the infrastructure and upgrade the shanty towns. To take advantage of the political circumstances outlined in the previous chapters, the state had to complete the park quickly. Moreover, SEDURB had no experience of conservation. How could the planning agency of a state government in the poorest region of a developing country overcome difficulties that so often confound agencies throughout the world? How could they establish this park in the space of little more than a year?

Part of the reason lies in the park project's fit with one of the agency's old projects. Policies generally are easier to implement if they fit with agencies' existing knowledge and understanding (Weiss and Cohen 1992). Also, an agency can only take advantage of sudden opportunities, such as those described in Chapter 2, if it is prepared to do so (March and Olsen 1976). The Cocó park fit with knowledge and understanding officials gained through a long range plan developed in the late 1970s. This is surprising because current planning literature seldom has positive words to say about long range plans, that were so fashionable in the 1950s. Most authors conclude that plans serve principally to gather dust on bureaucrats' shelves, as they are impossible to implement (Caiden and Wildavsky 1971). This literature tends to deal with multi-sectoral plans, where one program or document aims to coordinate the actions of several state agencies. The agencies that make the long range plans are also often not those that have to implement them. They tend therefore to be impracticable and their objectives may even conflict with those of implementing agencies (Pressman and Wildavsky 1973).

In contrast, SEDURB's long range plan dealt with a single sector, water resources, and SEDURB implemented the plan itself. SEDURB drew it up in response to the 1965 Federal Forestry Code, which created 30 m protected strips of land on the banks of all rivers and lakes in order to protect the country's water

resources. The Code excepted urban areas, because they could not leave such large areas undeveloped. Brazil has nine classified urban and metropolitan areas, of which Fortaleza is one.

Under the provisions of the code, they each had to develop drainage plans and pass implementing legislation in order to establish narrower protection strips along water courses. Ceará's metropolitan agency, SEDURB, prepared a map of all the lakes and rivers in the metropolitan region and created the State Drainage Plan, published in 1976. This plan served as the basis for the state water laws, which the legislature passed in 1977.[30] These establish a 15 m protected strip on the borders of the principal water resources in the metropolitan region, or individually specified strips for particular water courses. The strip for the Cocó river protected all land on the banks less than three meters below sea level.

SEDURB designed the plan only to protect water resources, and did not take biological criteria into account. For example, the original protection zone may easily cut through an ecologically valuable area of mangrove, leaving half of it protected and the area lying outside the protected strip available for development. Even those areas that the law protected suffered destruction. Lax enforcement meant that landowners, developers and squatters routinely ignored these laws and built apartments, established industries, set up shanty towns, or dumped waste on protected land. Land speculation, which caused most destruction, was most intense in the areas on valuable land, including along the banks of the River Cocó.

More than a decade after it published the Drainage Plan, the governor put SEDURB in charge of planning the Cocó park. Some of the plan's original

30 Law 10.1477 of 1 December, 1977 concerning land use for protection of hydrological resources in the Metropolitan Region of Fortaleza and Law 10.148 of 2 December, 1977 concerning the preservation and control of hydrological resources in the Ceará.

authors still work in SEDURB, and the agency's civil engineers use the plan regularly. Most officials find the study valuable; some refer to it as their Bible. These officials saw the park as an opportunity to ensure enforcement of the state water laws, at least for one river. Although the Parque do Cocó is designed to protect biological as well as water resources, its borders expand on the original protected strip established under the water laws. The engineers and hydrologists therefore saw it as a natural extension of the earlier plan, the latest stage in an on-going project the agency had been carrying out for fifteen years.

This fit with the Drainage Plan contributed to the park's success in two ways. First, the park inspired enthusiasm among the SEDURB park planners, making them more inclined to implement the new project, as it allowed them to add to the implementation of an old project that they liked, and they knew many of the technical issues involved. Second, the previous plan allowed them to act upon the park plans quickly, as they had completed background studies, taken aerial photographs and gathered other data more than a decade before.

In summary, members of the Jereissati administration often portray the Parque do Cocó as a bold new initiative to conserve the state's precious natural resources. In fact, it was an extension of a general plan that had been simmering on the back burner for more than ten years. SEDURB did work quickly, but could only do so because the Cocó project had a long administrative gestation, just as it had a long history of public protest. The park project in 1989 dovetailed within an overall plan for the region's water resources that SEDURB had written in the late 1970s. SEDURB officials thus viewed the Cocó project positively, and had much of the technical information they needed to define the boundaries of the new protected area, helping them overcome the difficulties of implementing this complex project.

5.3 Reduced Administrative Burdens

The best projects are those that reduce the amount of effort for the implementing agency, both in creating the project and in maintaining it (Ostrom 1992). Two aspects of the Cocó project's design caused local communities, working in their own self-interest, to help the agencies involved implement and maintain the project.

First, self-help housing reduces the implementation burden on public officials. When communities build their own houses with materials and technical assistance from the state, community leaders take on a coordination task that would otherwise fall to an official from the housing agency. This enables COHAB officials to become involved in upgrading a larger number of houses. Self-help only reduces burdens, however, when the shanty town organizes this construction effectively. A badly organized community, such as Conjunto Tancredo Neves, can make the housing agency's job harder.

Second, the local communities help the state monitor the park. Monitoring is a key problem for environmental projects (McNeely 1988, Wells and Brandon 1992). By now, most developing countries have established environmental agencies and have a comprehensive set of laws and regulations for environmental protection, but they generally lack either the will, political power, finance, and/or the institutional capability to implement or enforce these laws and regulations (WDR 1992, Morell and Poznanski 1985:144-154). As the head of Ceará's environmental agency, SEMACE, put it: "Our environmental protection laws here in Ceará are among the best in the country, but no-one complies. Even if we had the infrastructure, we couldn't put an inspector beside every waste water pipe, nor an eco-policeman beside every tree." The principal threat to the Cocó mangroves comes from squatters invading the land and setting

up settlements, both destroying vegetation and discharging waste into the river. The residents of the upgraded shantytowns, Aerolândia and Conjunto Tasso Jereissati, no longer consider their neighborhood a *favela*, and want to avoid connotations with shantytowns. They therefore repel any invaders that try to construct shanties nearby, and thus reduce (although obviously do not remove) the need for park monitoring.

In summary, this chapter describes the institutional aspects that led to the success of the Cocó case. First, administrative burdens did not stifle the project, as they do so many others, because it fell to the relatively powerful urban planning agency rather than the weaker environmental agency. SEDURB was able to push the project through and overcome any inter-agency conflicts. This agency was coordinating plans for shanty town upgrading, which helped integrate the park with housing low-income communities. Second, the project fit well into a major study of water resources that SEDURB had carried out more than a decade before. Officials therefore agreed with the park project's aims and worked more enthusiastically on the park. They also had the technical information and background data they needed to plan the park quickly. Third, two aspects of the park's design reduced administrative burden. Self-help housing programs have community members performing the coordination that would otherwise fall to the housing agency official. The communities that the state upgraded as part of the project then help to monitor and enforce the mangrove protection, by repelling any squatters that try to invade land near to their new houses. The administrative design of this project arose fortuitously, because the environmental agency was not ready to take on the park. Future projects could, however, incorporate the lessons from this fortuity.

CHAPTER 6
CONCLUSIONS

Many aspects of the success of the Parque do Cocó were contingent on a combination of local circumstances and past events particular to Fortaleza at that time. This appears to limit the potential for intervention, since these circumstances can neither be predicted nor reproduced. On the contrary, however, policy makers could deliberately incorporate into future projects many of the successful aspects that arose fortuitously in this case. This project that successfully integrated conservation with low-income housing reveals the following lessons:

First, the project worked, despite not meeting some of the preconditions for success documented in the literature. Literature on integrating conservation with the needs of local people says, amongst other things, that projects should be planned from the start as an integrated whole, and that local people and/or officials should be educated about the importance of conservation. The Cocó project worked because politicians and officials wanted it to, even though integration with *favela* upgrading was *ad hoc* and only the environmentalists had any formal environmental education. In contrast, the park is now a key part of the state's environmental education program.

Second, what appeared to be a compromise initiative, turned out to be the best option. The park was an opportunistic response by the governor to a combination of political and structural factors. Investing in despoiled rather than pristine mangrove was more politically attractive and easier to implement. Decision-makers did not act according to some master plan, but took advantage

of circumstances to adopt the plan that was possible. Although perhaps less than perfect ecologically, this park exists, and the state is enforcing its protection. There are many valuable ecosystems all over the world that are of international biological significance but that are not protected. Activists have long lists of campaigns for areas to be protected, struggles that have either failed or that have not come to fruition even after years of campaigning. Even amongst those parks that have been created in developing areas, the great majority are threatened by illegal uses and encroachment. These problems are often the result of complex phenomena involving marginalization of poor communities, forcing them to exploit natural resources beyond sustainable yields. Conservation in the form of protected areas seldom addresses these root causes, yet it does offer some protection to the land. As such it can be seen as a robust band-aid solution. The Parque do Cocó was better than a band aid, however, because it protects the mangrove, and stimulated measures to rehabilitate the very groups on the park's perimeter that often threaten conservation attempts in other areas.

Third, apparent constraints can become advantages. Much of the success of this project is the result of serendipitous circumstances, but it need not have been. In the Cocó case, the park planners were boxed in: they could not ignore the squatters, because the untreated sewage from 10,000 people polluted the river, whilst state policies prevented them from moving the squatters to another area. They therefore had to choose that area to upgrade, and install sewage systems. Officials could look for, or create, situations that have similarly constrained conditions, where different actors have no choice but to combine their interests into one project.

Fourth, conservation brought other benefits. Environmentalists often think of conservation as an end in itself. In the case described here, a conservation initiative had spill-over effects in other parts of the city. The state

created the park as part of an initiative to clean up the River Cocó that involved building a waste water treatment plant and new landfill site to remove pollution sources upstream of the park. The state upgraded the shanty towns that were polluting the park. These successful projects encouraged COHAB and SEDURB at the beginning of the city-wide upgrading program.

Fifth, administration was easier because the land use agency, rather than the environmental agency, coordinated the project. The land use agency implements infrastructure projects in the municipal area and is more powerful than the environmental agency. The project's fit with the agency's past work helped officials implement the park plans quickly.

In conclusion, the Parque do Cocó is a small area of mangrove swamp. Its principal interest does not come from its fauna and flora. It stands in the center of Brazil's fifth largest city as an example of the possible benefits of conservation to the whole city. It has contributed to teaching a part of the city's population and its civil servants about the benefits of flexible and strategic planning, as well as the advantages of nature conservation. Because it managed to reconcile conservation with the housing and sanitation needs of local communities, this project is one small, but rare, example of success.

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ANNEX 1
CHRONOLOGY OF EVENTS

1969 The municipal government tried to expropriate a 20 ha site on the banks of the river Cocó and create Fortaleza's first leisure park. Lack of funds for the expropriation made this impossible and the plans were shelved.

1974 Autarquia da Região Metropolitana de Fortaleza (AUMEF) is formed to coordinate all land use planning in Fortaleza and the surrounding municipalities. One of their first tasks is to carry out a drainage plan for the metropolitan region. AUMEF therefore starts mapping out and defining the water resources.

1976 A Professor of Physics at the Federal University of Ceará starts the Ceará Society for Environmental Protection, composed of other academics, students and some professionals (architects and engineers). The first campaigns are to stop the use of pesticides on Fortaleza roadsides and to protect the coconut palms along the beach front.

As part of the planned drainage plan, state laws 10.147 and 10.148 are passed which establish a 15 meter protection zone on the margins of all water resources.

1977 AUMEF completes mapping the region's hydrological resources and publishes the drainage plan, which defines protection areas on the borders of all rivers in the metropolitan area. This plan is designed to protect water resources, the protection zones, therefore, are based on hydrological rather than biological criteria.

The Bank of the Northeast of Brazil (BNB) begins to negotiate with the city government to buy an area on the banks of the River Cocó on which to build its headquarters. SOCEMA views this as a threat to one of the last remaining pieces of mangrove in the city center and campaigns to stop the construction and protect the land by converting it into a leisure park.

1978 SOCEMA's campaign to stop the BNB's construction on the banks of the Cocó culminates in an ecological picnic attended by over 2,000 people. Eleven days later, the president of the BNB writes to the city hall abandoning their plans. The municipal government expropriates the land and converts it into the leisure

park the campaigners had demanded, the 46 hectare Parque Adail Barreto, now part of the larger Parque do Cocó.

1980 The banks of the River Cocó flood constantly, causing problems for the people living in illegal settlements on its banks. In an attempt to resolve this problem, AUMEF dredges the river, a process that creates the Cocó Lake (Lagôa de Cocó). The land on the borders of the lake is owned by private landowners, one of whom still owns large tracts of land in the current Park. AUMEF expropriates this land and uses the land on the north shore to deposit the dredged material. The state begins a federally-funded housing project on the south shore, where many of the residents of the original shanty towns move. This project, Conjunto Tancredo Neves, subsequently expands as more illegal invaders move in around the housing project.

1982 Opening of Iguatemí, a shopping center on the banks of the River Cocó, the construction of which involving cutting down 23 ha of mangrove. This area directly abuts what are now the limits of the park. The developer of this site is Tasso Jereissati, who will become governor of the state in 1986. SOCEMA and others had organized a small but vocal protest against this development. The campaigners refer to this as the only real fight they have lost.

1985 Brazil returns to civilian rule. The political liberalization that accompanied this change allowed many civil movements to develop, including SOS Cocó, formed by representatives of a broad group of organizations with environmental interests in Ceará to fight for a program to clean up the river and protect the mangroves on its banks.

1986 Fortaleza elects a mayor from the Workers' Party (PT) in the first democratic mayoral elections since 1964. Maria Luiza Fontenele has a program which encourages the poor and disadvantaged groups to organize themselves. She organizes, encourages and takes part in demonstrations demanding, *inter alia*, low cost housing and services from the state government.

The municipal agency with responsibility for planning and the environment, SPLAM, designates the area beneath the high water line for the whole of the Rio Cocó as an environmental protection zone. The reasons for this

seem to be largely political in nature, as the move makes no substantive change to land use.

At this point all low income housing projects are planned and funded at the federal level, and implemented by the state branch of the federal agency (COHAB). No state money funds shanty town upgrading. The functions of the Federal Agency responsible until now for developing and implementing national policies on low income housing transfer to the Federal Savings Bank (Caixa Económica Federal). As part of the financial reforms at a federal level under President Sarney, CEF restricts federal funds for housing projects.

1987 The state's first democratically elected governor since 1964 takes office. Tasso Ribeiro Jereissati is a young, urban businessman and founder of the Brazilian Social Democratic Party (PSDB).

Some 2,000 squatter families invade the land that had previously been expropriated on the north bank of the Lagôa de Cocó. The families construct shacks on top of the dredged material and call the area Aerolândia.

The Federal Government sets up the Special Secretariat for Housing and Community Action (SEHAC) to try to relieve some of the stress caused by blocking funds to all states with internal debt. This agency begins a national initiative for self built housing, as part of which state government of Ceará was to build some 4,000 houses.

1988 AUMEF coordinates a team, led by a professor from the Federal University of Ceará (UFC), to define the area the state should designate as a park. This study stresses the biological and ecological aspects of the area, whereas the previous study had defined the protection zones merely in terms of how they would protect the water resources.

The Federal Government disbands SEHAC, and COHAB abandons the plans for self-built houses. The State Urban Development Secretariat (SDU) decides to continue with the plan, this time using state funds. The first sites chosen for this initiative are both banks of the Lagôa do Cocó, on the land already expropriated by the state.

Two state decrees define the areas along the banks of the Cocó river designated for top category environmental protection and declare part of this are the Parque Ecológico do Cocó.

Fortaleza elects Ciro Ferreira Gomes as mayor. He is from the same party as the governor (PSDB).

1989 The state of Ceará elects Ciro Gomes as governor to take over from Tasso Jereissati.

1991 The community on the north bank of the Lagôa do Cocó, Aerolândia, complete constructing 1,200 self -built houses with water and sewage services. 400 of these are on the south bank, adjacent to Conjunto Tancredo Neves (built in 1980) in an area that will be known as Conjunto Tasso Jereissati.

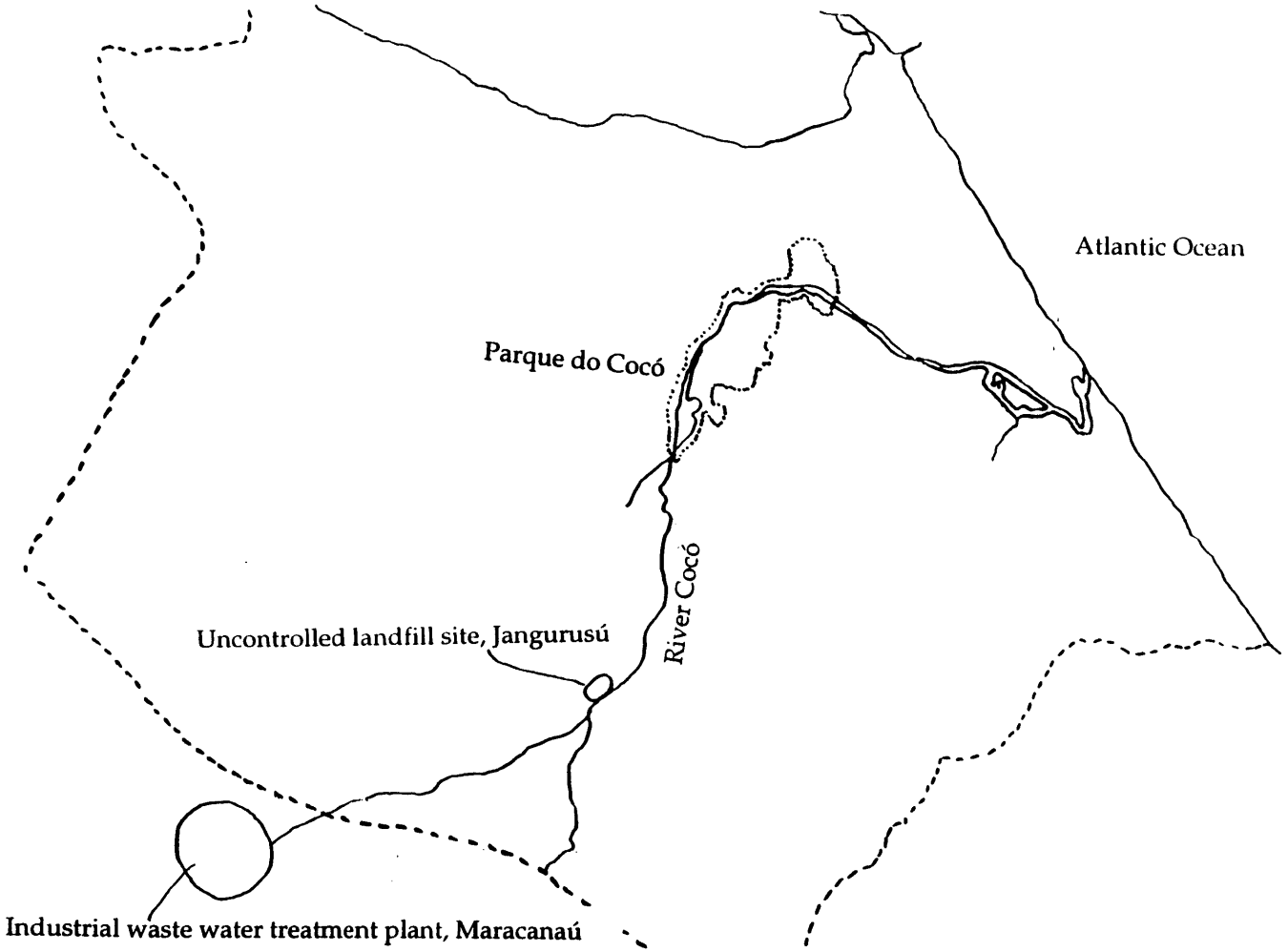
Building from this initial experience, SDU expands the self-built shanty town upgrading program to other areas of the state. Over five years the state moves from getting around 1,000 houses constructed per year, to over 6,000.

1992 AUMEF (now called SEDURB) starts self-built housing project in Barroso, close to the Lagôa do Cocó to take the residents of Tancredo Neves, the shanty on the south bank of the Lagôa do Cocó. These families cannot stay on the sites of their original homes, as they are within the flood area.

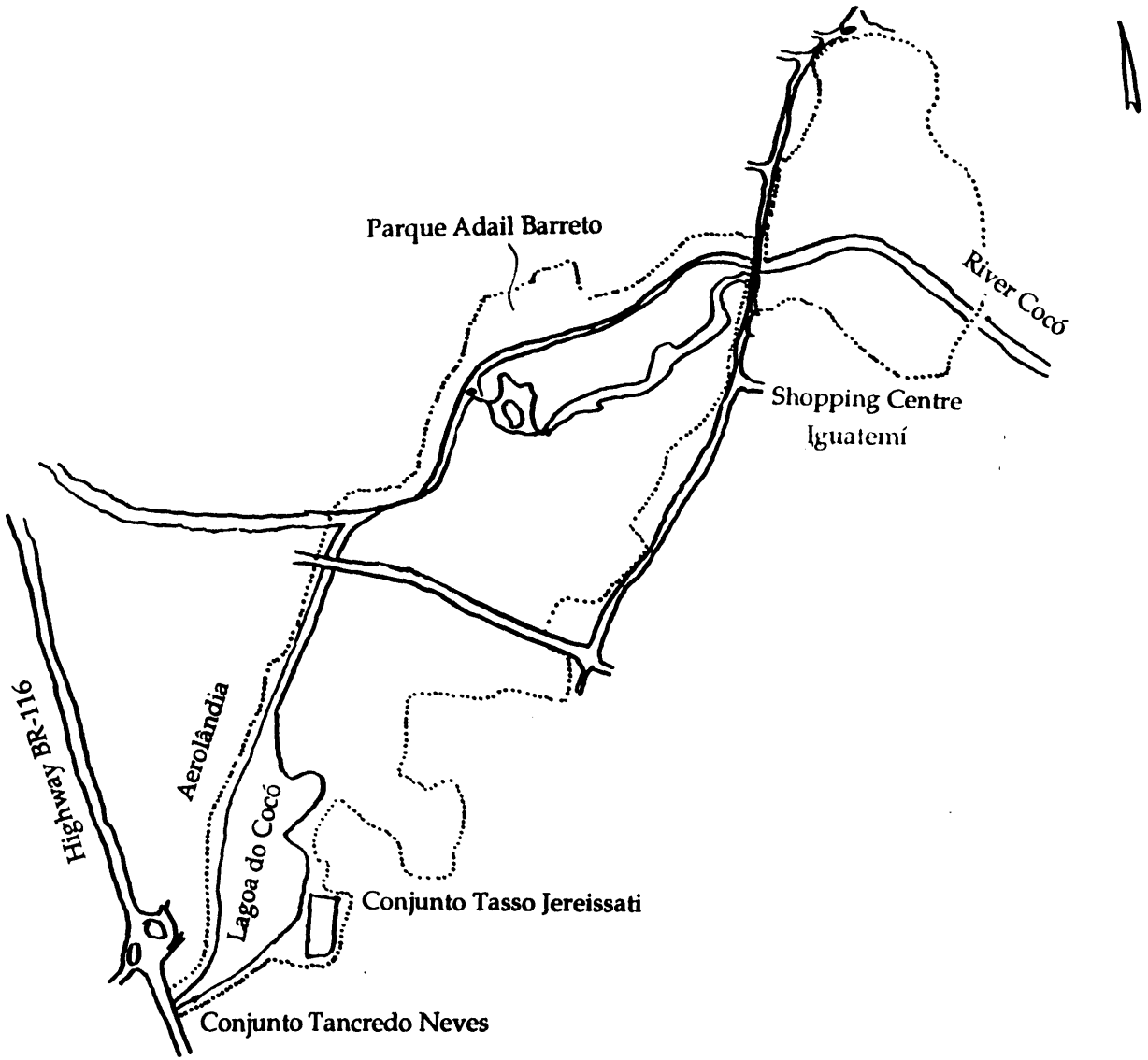
ANNEX 2
MAPS

MAP 1: BRAZIL

MAP 2: THE MUNICIPALITY OF FORTALEZA



MAP 3: PARK LAYOUT



ANNEX 3
LIST OF INTERVIEWS

1 Public Agencies

Superintendency for Urban Development and the Environment (SDU). Interviews with Dr. Marconi, Roberto Craveiro and Dra. Elena, engineers responsible for low-income housing programs. 4 August 1992.

Secretariat for Urban Development (SEDURB). Total of ten interviews including:
- Airton Ibiapina Montenegro Jr., the head of the agency. 27 July 1992.
- Marta de Matos Brito Gradvohl, Director of the Department of Technical Information. 15 June 1992
- Francisco Mendes Giffoni, assistant to agency head. 7 August 1992.
- Dr Rui, engineer responsible for drainage systems in low-income communities. 15 June 1992.
- Dr Fernando, director for the land use division. 7 August 1992.

Secretariat for the Environment (SEMACE). Total of nine interviews including:
- Eduardo de Araújo Soares, head of SEMACE. 14 July 1992.
- Regina de Araújo Soares, Technical Director. 16 June and August 1992
- Paulo de Castro Miranda, director of the Division for Protection of Natural Resources. 17 July and 22 July, 1992.
- Dr Williams, department of water quality. 17 July 1992.
- José Cristomo, department of technical assistant to municipalities. 10 August 1992
- Dra. Lúcia, administrator of the state environment council. 25 August 1992.

State Housing Company (COHAB). 4 interviews including:
- Mires Marinho Bouty, department for special settlements. 14 August 1992.
- Marco Antonio de Menenses, head of construction. 19 and 25 August 1992.
- Dra Virginia, research department. 25 August 1992.

State Water and Sewage Company (CAGECE). 7 interviews including:
- Carlos Augusto Moreira, Assistant to the head of operations. 30 July 1992.
- Renato Rollin, technical operations. 3 August 1992.
- Luciano Freire Maia, sanitation department of the central laboratory. 19 August

Superintendency for Labor and Social Programs. 5 interviews including:
- Adolfo de Marinho Pontes, former head of SEDURB, then head of the Secretariat for Urban Development and the Environment, currently head of the Superintendency. 8 July 1992
- Ruth Torres Hollanda, Architect. Former SDU employee. 24 July and 3 August 1992.
- Ediny Lemos, capital city division. 3 August 1992

Municipal Agencies. 5 interviews including:
- Tomaz Lima de Carvalho Rocha, President of the Municipal Waste Company, EMLURB. 10 July 1992

- Pedro Secundo Maia Rocha, Director of Operations at EMLURB. 14 July 1992.
- Helder Bonfim, head of SPLAN, municipal environmental agency. 16 August 1992

2 Key Individuals

Aída Maria Eskinazi de Oliveira, marine biologist from the Federal University of Ceará's laboratory, Labomar, head of the technical team to delimit the park boundaries. 12 August 1991.

Maria Luiza Fontenele, Federal Deputy and former mayor of Fortaleza. 20 August 1992.

João Gentil, owner of 220 ha of land expropriated to create the park. 3 August 1992.

Ciro Gomes, Governor of the state of Ceará. 27 July and 24 August 1992

Nilson Holanda, former President of the Banco do Nordeste do Brasil. 21 July 1992.

Tasso Ribeiro Jereissati, former Governor of Ceará, 6 August, 1992.

3 Low Income Communities

Dona Raimundinha, community leader of Aerolândia. 24 June 1992

Dona Raimunda Chaves, president of the residents' association of Lagamar. 26 June 1992.

Visits to Conjunto Tancredo Neves, Conjunto Tasso Jereissati, Barroso, Lingua de Cobra, Vila Velha.

4 Environmentalists

João Alfredo, lawyer, former State Deputy and head of the state legislative assembly's environmental committee. Member of the State Environment Council and environmental activist. 24 August 1992.

Marilha Brandão, Professor of Biology, Federal University of Ceará (UFC), one of the founder members of SOCEMA, and member of the State Environment Council. 30 July 1992.

Vanda de Claudino Sales, Professor of Geography of the Federal University of Ceará. Member of SOS Cocó and State Environment Council. 8 July 1992

João Saraiva, head of the Ceará branch of the Green Party. 22 July 1992.

Flávio Torres de Araújo, Professor of Physics, UFC and founder of SOCEMA. 13 August 1992.